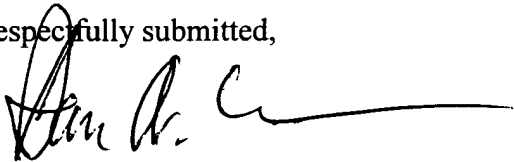


1 a copy of the original drawings with red ink indicating these changes.

2
3 Remarks

4 Grammatical and typographical errors were discovered in the Specification,
5 Drawings, and Claims, which are hereby corrected. No new matter is being introduced by
6 these changes.

7
8 Respectfully submitted,

9 

10 DEAN A. CRAINE

11 Reg. No. 33,591



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TITLE: METHOD OF MANUFACTURING PILLAR GEL CANDLES

BACKGROUND OF THE INVENTION

1. Field of the Invention:

This invention pertains to methods of manufacturing candles, and more specifically, to methods of manufacturing pillar gel candles.

2. Description of the Related Art:

Recently, gel candles made of highly refined, high viscosity hydrocarbons oils have become popular. Some of the main advantages of gel candles are the easy manufacturing, long life and low soot production. A leading company in this technology is Penreco Company, located in Houston, Texas, which has obtained a U.S. Patent (No. 5,879,694) for a novel, transparent gel candle composition. The gel candle composition uses a hydrocarbon oil and at least one co-polymer selected from a group consisting of a triblock polymer, a radial block copolymer, a multiblock copolymer, and an optional diblock polymer that produces a firm candle with suitable rheological properties.

1 In the Inventor's co-pending U.S. patent application (Serial No. 09/998,436 filed
2 November 30, 2001), an improved gel candle composition is disclosed that uses three
3 different viscosity mineral oils and a polymer to produce a containerless or freestanding
4 (a.k.a. pillar) gel candle. Because the mineral oils are clear, the gel candle appears to be
5 made out of glass or similar crystallized materials. Unfortunately, because the gel candle is
6 tacky, standard candle molds and molding techniques cannot be followed.

8 SUMMARY OF THE INVENTION

9 It is an object of the present invention to provide a method of manufacturing a
10 freestanding pillar gel candle.

11 It is another object of the present invention to produce such a gel candle with smooth,
12 glass-like, surfaces.

13 These and other objects are met by a method of manufacturing a freestanding pillar
14 gel candle disclosed herein that uses the following steps: (1) selecting a pillar candle mold
15 capable of being assembled and disassembled from a pillar candle, said mold being open on
16 at least one end and having smooth, non-porous inside surfaces; (2) assembling the mold in a
17 vertical position on a flat surface; (3) manufacturing a clear gel candle composition capable
18 of being used to produce a freestanding pillar candle; (4) heating the gel candle composition
19 to a liquid state; (5) pouring the heated gel candle composition into the assembled mold; (5)
20 allowing the gel candle composition to cool; and (6) disassembling the mold to produce a
21 freestanding pillar candle.

22 In the preferred embodiment, the mold forms a freestanding, polyhedron-shaped gel
23 candle with a plurality of planar side surfaces. The mold is made of a plurality of side wall

1 components that are vertically aligned and forced together to form a mold with a polyhedron-
2 shaped central void in which the melted gel candle composition may be poured. The mold
3 has top and bottom openings so that it may be easily broken down and pulled away from the
4 gel candle when cool. A temporary holding means, such as an elastic strap, is used to
5 temporarily hold the side wall components together. In the preferred method, the mold is
6 assembled on a ceramic tile base. All of the side wall components have polished, non-porous
7 contact surfaces such as those found on metal, glass, or ceramic, to produce smooth, glass-
8 like surfaces that enhance the overall beauty of the gel candle.

10 DESCRIPTION OF THE DRAWINGS

11 Fig. 1 is a perspective view of the mold assembled on a ceramic surface.

12 Fig. 2 is a side elevational view of the mold.

13 Fig. 3 is a top plan view of the mold.

14 Fig. 4 is a flow chart of the steps used to manufacture the gel candle.

16 DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

17 Disclosed herein is a method of manufacturing a pillar gel candle 60 with smooth,
18 glass-like side walls. The method begins by assembling a mold 10 in which the molten gel
19 candle composition 20 is poured. In the preferred embodiment, the mold 10 comprises a set
20 of converging side wall components 22 perpendicularly aligned over a flat base member 30 to
21 form a polyhedron-shaped mold 10 with top and bottom openings 12, 13, respectively. Each
22 converging side wall component 22 includes a straight outside surface 24, a straight inside
23 surface 25, two converging side surfaces 26, 27, and parallel, flat, top and bottom surfaces

1 28, 29. When assembled, the side surfaces 26, 27 of adjacent converging side wall
2 components 22 are forced and held together using an adjustable or elastic strap 50, rubber
3 bands, or other suitable means to create a closed enclosure with sufficiently closed seams
4 between the adjacent side wall components 22 so that the heated gel candle composition 20
5 will not seep through. The side wall components 22 are made of any suitable rigid material
6 with highly polished and non-porous inside surfaces 25. In the preferred embodiment, the
7 inside surface 25 comprises a stainless steel plate adhesively attached to the side wall
8 component 22. When the gel candle 60 is molded, the polished, non-porous inside surface 25
9 produces a smooth, glass-like finish on each planar surface 61 of the gel candle 60. In the
10 preferred embodiment, the mold 10 is assembled on a ceramic tile 70 so that the gel candle
11 composition 20 slowly and evenly cools.

12 In the preferred embodiment shown in the Figs., the mold 10 includes eight identical
13 side wall components 22 that produce a octagonal pillar gel candle 60.

14 After the mold 10 is assembled, the gel candle composition 20, disclosed in the
15 Inventor's co-pending U.S. patent application (Serial No. 09/998,436) and incorporated
16 herein, is prepared. The gel candle composition 20 is made of a high viscosity first mineral
17 oil, a second mineral oil, and a third mineral oil, all mixed together with a thermoplastic
18 polymer to produce a heterophase thermally reversible mineral oil gel. The first mineral oil
19 used (58% to 81% wt.) to manufacture the gel candle composition 20 is a medium range
20 viscosity (106.5 – 125.5 cSt.) such as the mineral oil product manufactured and sold by
21 Penreco Company under the trademark DRAKEOL - 600. The second mineral oil used (8-
22 9%) is a higher viscosity (180 – 240 cSt) mineral oil product manufactured and sold by Witco
23 Company and sold under the trademark HYDROBRITE-1000. The third mineral oil used (2

1 to 6% wt) is a lower viscosity mineral oil (72 – 79.5 cSt.) is a mineral oil product
2 manufactured and sold by Penreco Company under the trademark DRAKEOL 34. The
3 stabilizing polymer is a thermoplastic polymer manufactured and sold by Kraton Polymers
4 (12% to 16 % wt.) located in Belpre, Ohio (USA).

5 During manufacture, the three mineral oils and polymer are mixed together in a
6 suitable mixing container. The mixture is then allowed to sit overnight, allowing the oil to
7 soak into the polymer to create a homogenous product. The mixture is then poured into
8 cylindrical stainless steel heating tanks that have heating elements affixed to their bottom and
9 sides. Reject gel candles from previous batches may be added to the mixture which is then
10 heated for 16 – 24 hours to a temperature of 335 – 345 degrees Fahrenheit. Scent and dye are
11 added just before pouring.

12 Each mold 10 is positioned in an upright, vertical position on a ceramic tile 70. The
13 mold 10 is then filled using a valve mounted to the side of the heating tank. The mold 10 is
14 positioned under the valve and the valve is slowly opened so that the melted gel candle
15 composition 20 flows into the top opening 12 and completely fills the central void in the
16 mold 10. As the melted gel candle composition 20 flows into the central void , the user
17 inserts a steel rod about the size of a knitting needle into the flow to interrupt the stream thus
18 minimizing the air bubbles. The mold 10 is filled to the top surface 28 and the valve is shut.
19 If desired, another mold 10 is placed under the valve to repeat the process.

20 The filled mold 10 is then inspected and a heat gun may be used to pop any air
21 bubbles that may have been created in the gel candle composition 20 and floated to the top.
22 If air bubbles are created that stick to the side of the mold 10, a thin rod may be inserted to
23 dislodge the air bubble and pull it to the surface so it may be popped.

1 Additional molds 10 may be continuously filled until the heating tank is empty. The
2 heating tank is refilled with another batch. The molds 10 are allowed to cool for
3 approximately 8 hours.

4 After the molds 10 have cooled, each candle 60 is then threaded with a wick (not
5 shown) using a simple jig to vertically align the wick in the center of the pillar gel candle 60.
6 The wick is then trimmed to the correct length. The adjustable strap 50 is then removed and
7 the mold 10 is then broken down and removed from the pillar gel candle 60. The pillar gel
8 candle 60 is then trimmed if necessary and then packaged into its container. The mold 10 can
9 then be reassembled for manufacturing other pillar gel candles. When finished, the pillar gel
10 candle 60 is a polyhedron-shaped pillar candle with smooth, glass-like planar side surfaces.
11 The bottom surface 62 is flat while the top surface 63 is slightly concave.

12 In compliance with the statute, the invention described herein has been described in
13 language more or less specific as to structural features. It should be understood, however,
14 that the invention is not limited to the specific features shown, since the means and
15 construction shown, is comprised only of the preferred embodiments for putting the invention
16 into effect. The invention is therefore claimed in any of its forms or modifications within the
17 legitimate and valid scope of the amended claims, appropriately interpreted in accordance
18 with the doctrine of equivalents.
19
20
21
22
23

ABSTRACT OF THE DISCLOSURE

A method of manufacturing a pillar gel candle that produces a crystal clear, freestanding, pillar-style gel candle. The steps of the method include assembling the mold, manufacturing a gel candle composition suitable for making a pillar gel candle, pouring the gel candle composition into the assembled mold, allowing the gel candle composition to set, and disassembling the mold. The mold is made of a plurality of side member components which form a central polyhedron-shaped void in which the heated gel candle composition is poured. Each side member component has a smooth, polished, inside surface to produce a pillar gel candle with smooth, glass-like appearing surfaces.



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CLAIMS

I claim:

1. A method of manufacturing pillar gel candles, comprising the following steps:
 - a. selecting a mold made of a plurality of side walls that form a central void, said mold having a top opening;
 - b. assembling the mold or a support surface;
 - c. producing a liquid gel candle composition;
 - d. pouring said liquid gel candle composition into said central void of said mold;
 - e. allowing said gel candle composition to cool to form a pillar gel candle; and,
 - f. disassembling said side wall of said mold from said pillar gel candle.
2. The method of manufacturing a pillar gel candle as recited in Claim 1, wherein the gel candle composition includes:
 - a. a first mineral oil having a viscosity in a range of 106.5 to 125.5 (cSt) and in the amount between 58% and 81% by weight;
 - b. a second mineral oil having a viscosity in a range of 180 to 240 (cSt) and in the amount of 5% to 20% by weight;
 - c. a third mineral oil having a viscosity in a range of 72 to 79.5 (cSt) and in the amount of 2% to 6% by weight; and,
 - d. a stabilizing polymer in a range of 12% to 16 % by weight.
3. The method of manufacturing a pillar gel candle as recited in Claim 1, wherein each said side wall has a smooth, non-porous inside surface.

1 4. The method of manufacturing a pillar gel candle as recited in Claim 1, wherein said
2 inside surface of said mold side walls is made of stainless steel.

3
4 5. The method of manufacturing a pillar gel candle as recited in Claim 3, wherein said
5 mold side walls are made of glass.

6
7 6. The method of manufacturing a pillar gel candle as recited in Claim 1, wherein said
8 mold includes a bottom opening.

9
10 7. The method of manufacturing a pillar gel candle as recited in Claim 1, wherein there
11 are eight side walls of said mold, thereby forming an eight-sided polyhedron.



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TITLE: METHOD OF MANUFACTURING PILLAR GEL CANDLES

BACKGROUND OF THE INVENTION

1. Field of the Invention:

This invention pertains to methods of manufacturing candles, and more specifically, to methods of manufacturing pillar gel candles.

2. Description of the Related Art:

Recently, gel candles made of highly refined, high viscosity hydrocarbons oils have become popular. Some of the main advantages of gel candles are their easy manufacturing, long life and low soot production. A leading company in this technology is Penreco Company, located in Houston, Texas, which has obtained a U.S. Patent (No. 5,879,694) for a novel, transparent gel candle composition. The gel candle composition uses a hydrocarbon oil and at least one co-polymer selected from a group consisting of a triblock polymer, a radial block copolymer, a multiblock copolymer, and an optional diblock polymer that produces a firm candle with suitable rheological properties.

1 In the Inventor's co-pending U.S. patent application (Serial No. 09/998,436 filed
2 November 30, 2001), an improved gel candle composition is disclosed that uses three
3 different viscosity mineral oils and a polymer to produce a container-less or ~~free-~~
4 ~~standing~~freestanding (a.k.a. pillar) gel candle. Because the mineral oils are clear, the gel
5 candle appears to be made out of glass, or similar crystallized materials. Unfortunately,
6 because the gel candle is tacky, standard candle molds and molding techniques cannot be
7 followed.

8 9 SUMMARY OF THE INVENTION

10 It is an object of the present invention to provide a method of manufacturing a ~~free-~~
11 ~~standing~~freestanding pillar gel candle.

12 It is another object of the present invention to produce such a gel candle with smooth,
13 glass-like, surfaces.

14 These and other objects are met by a method of manufacturing a ~~free-~~
15 ~~standing~~freestanding pillar gel candle disclosed herein that uses the following steps: (1)
16 selecting a pillar candle mold capable of being assembled and disassembled from a pillar
17 candle, said mold being open on at least one end and having smooth, non-porous inside
18 surfaces; (2) assembling the mold in a vertical position on a flat surface; (3) manufacturing a
19 clear gel candle composition capable of being used to produce a ~~free-standing~~freestanding
20 pillar candle; (4) heating the gel candle composition to a liquid state; (5) pouring the heated
21 gel candle composition into the assembled mold; (5) allowing the gel candle composition to
22 cool; and (6) disassembling the mold to produce a ~~free-standing~~freestanding pillar candle.

23 In the preferred embodiment, the mold forms a ~~free-standing~~freestanding, polyhedron-

1 shaped gel candle with a plurality of planar side surfaces. The mold is made of a plurality of
2 side wall components that are vertically aligned and forced together to form a mold with a
3 polyhedron-shaped central void in which the melted gel candle composition may be poured.
4 The mold has top and bottom openings so that it may be easily broken down and pulled away
5 from the gel candle when cool. A temporary holding means, such as an elastic strap, is used
6 to temporarily hold the side wall components together. In the preferred method, the mold is
7 assembled on a ceramic tile base. All of the side wall components have polished, non-porous
8 contact surfaces such as those found on metal, glass, or ceramic, to produce smooth, glass-
9 like surfaces that enhance the overall beauty of the gel candle.

11 DESCRIPTION OF THE DRAWINGS

12 Fig. 1 is a perspective view of the mold assembled on a ceramic surface.

13 Fig. 2 is a side ~~elevation~~elevational view of the mold.

14 Fig. 3 is a top plan view of the mold.

15 Fig. 4 is a flow chart of the steps used to manufacture the gel candle.

17 DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

18 Disclosed herein is a method of manufacturing a pillar gel candle 60 with smooth,
19 glass-like side walls. The method begins by assembling a mold 10 in which the molten gel
20 candle composition 20 is poured. In the preferred embodiment, the mold 10 comprises a set
21 of converging side wall components 22 ~~aligned perpendicular~~perpendicularly aligned over a
22 flat base member 30 to form a polyhedron-shaped mold 10 with top and bottom openings 12,
23 13, respectively. Each converging side wall component 22 includes a ~~curved~~straight outside

1 surface 24, a ~~curved~~straight inside surface 25, two converging side surfaces 26, 27, and
2 parallel, flat, top and bottom surfaces 28, 29. When assembled, the side surfaces 26, 27 of
3 adjacent converging side wall components 22 are forced and held together using an
4 adjustable or elastic strap 50, rubber bands, or other suitable means to create a closed
5 enclosure with sufficiently closed seams between the adjacent side wall components 22 so
6 that the heated gel candle composition 20 will not seep through. The side wall components
7 22 are made of any suitable rigid material with highly polished and non-porous inside
8 surfaces 25. In the preferred embodiment, the inside surface 25 comprises a stainless steel
9 plate adhesively attached to the side wall component 22. When the gel candle 60 is molded,
10 the polished, non-porous inside surface 25 produces a smooth, glass-like finish on each
11 planar surface 61 of the gel candle 60. In the preferred embodiment, the mold 10 is
12 assembled on a ceramic tile 70 so that the gel candle composition 20 slowly and evenly cools.

13 In the preferred embodiment shown in the Figs., the mold 10 includes eight identical
14 side wall components 22 that produce a ~~hexagonal~~octagonal pillar gel candle 60.

15 After the mold 10 is assembled, the gel candle composition 20, disclosed in the
16 Inventor's co-pending U.S. patent application (Serial No. 09/998,436) and incorporated
17 herein, is prepared. The gel candle composition 20 is made of a high viscosity first mineral
18 oil, a second mineral oil, and a third mineral oil, all mixed together with a thermoplastic
19 polymer to produce a heterophase thermally reversible mineral oil gel. The first mineral oil
20 used (58% to 81% wt.) to manufacture the gel candle composition 20 is a medium range
21 viscosity (106.5 – 125.5 cSt.) such as the mineral oil product manufactured and sold by
22 Penreco Company under the trademark DRAKEOL - 600. The second mineral oil used (8-
23 9%) is a higher viscosity (180 – 240 cSt) mineral oil ~~produce~~product manufactured and sold

1 by Witco Company and sold under the trademark HYDROBRITE-1000. The third mineral
2 oil used (2 to 6% wt) is a lower viscosity mineral oil (72 – 79.5 cSt.) is a mineral oil product
3 manufactured and sold by Penreco Company under the trademark DRAKEOL 34. The
4 stabilizing polymer is a thermoplastic polymer manufactured and sold by Kraton Polymers
5 (12% to 16 % wt.) located in Belpre, Ohio (USA).

6 During manufacture, the three mineral oils and polymer are mixed together in a
7 suitable mixing container. The mixture is then allowed to sit overnight, allowing the oil to
8 soak into the polymer to create a homogenous product. The mixture is then poured into
9 cylindrical stainless steel heating tanks that have heating elements affixed to their bottom and
10 sides. Reject gel candles from previous batches may be added to the mixture which is then
11 heated for 16 – 24 hours to a temperature of 335 – 345 degrees Fahrenheit. Scent and dye are
12 added just before pouring.

13 Each mold 10 is positioned in an upright, vertical position on a ceramic tile 70. The
14 mold 10 is then filled using a valve mounted to the side of the heating tank. The mold 10 is
15 positioned under the valve and the valve is slowly opened so that the melted gel candle
16 composition 20 flows into the top opening 12 and completely fills the central void 45 in the
17 mold 10. As the melted gel candle composition 20 flows into the central void 45, the user
18 inserts a steel rod about the size of a knitting needle into the flow to interrupt the stream thus
19 minimizing the air bubbles. The mold 10 is filled to the top surface 28 and the valve is shut.
20 If desired, another mold 10 is placed under the valve to repeat the process.

21 The filled mold 10 is then inspected and a heat gun may be used to pop any air
22 bubbles that may have been created in the gel candle composition 20 and floated to the top.
23 If air bubbles are created that stick to the side of the mold 10, a thin rod may be inserted to

1 dislodge the air bubble and pull it to the surface so it may be popped.

2 Additional molds 10 may be continuously filled until the heating tank is empty. The
3 heating tank is refilled with another batch. The molds 10 are allowed to cool for
4 approximately 8 hours.

5 After the molds 10 have cooled, each candle 60 is then threaded with a wick (not
6 shown) using a simple jig to vertically align the ~~needle~~-wick in the center of the pillar gel
7 candle 60. The wick is then trimmed to the correct length. The adjustable strap 50 is then
8 removed and the mold 10 is then broken down and removed from the pillar gel candle 60.
9 The pillar gel candle 60 is then trimmed if necessary and then packaged into its container.
10 The mold 10 can then be reassembled for manufacturing other pillar gel candles. When
11 finished, the pillar gel candle 60 is a polyhedron-shaped pillar candle with smooth, glass-like
12 planar side surfaces. The bottom surface 29-62 is flat while the top surface 28-63 is slightly
13 concave.

14 In compliance with the statute, the invention described herein has been described in
15 language more or less specific as to structural features. It should be understood, however,
16 that the invention is not limited to the specific features shown, since the means and
17 construction shown, is comprised only of the preferred embodiments for putting the invention
18 into effect. The invention is therefore claimed in any of its forms or modifications within the
19 legitimate and valid scope of the amended claims, appropriately interpreted in accordance
20 with the doctrine of equivalents.

1

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3

4 **ABSTRACT OF THE DISCLOSURE**

5 A method of manufacturing a pillar gel candle that produces a crystal clear, free-
6 ~~standing~~freestanding, pillar-style gel candle. The steps of the method include assembling the
7 mold, manufacturing a gel candle composition suitable for making a pillar gel candle,
8 pouring the gel candle composition into the assembled mold, allowing the gel candle
9 composition to set, and disassembling the mold. The mold is made of a plurality of side
10 member components which form a central polyhedron-shaped void in which the heated gel
11 candle composition is poured. Each side member component has a smooth, polished, inside
12 surface to produce a pillar gel candle with smooth, glass-like appearing surfaces.

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CLAIMS

I claim:

1. A method of manufacturing pillar gel candles, comprising the following steps:

- a. selecting a mold made of a plurality of side walls that form a central void, said mold having a top opening;
- b. assembling the mold or a support surface;
- c. producing a liquid gel candle composition;
- d. pouring said liquid gel candle composition into said central void of said mold;
- e. allowing said gel candle composition to cool to form a pillar gel candle; and,
- f. disassembling said side wall of said mold from said pillar gel candle.

2. The method of manufacturing a pillar gel candle as recited in Claim 1, wherein the gel candle composition includes:

- a. a first mineral oil having a viscosity in a range of 106.5 to 125.5 (cSt) and in the amount between 58% to 81% by weight;
- b. a second mineral oil having a viscosity in a range of 180 to 240 (cSt) and in the amount of 5% to 20% by weight;
- c. a third mineral oil having a viscosity in a range of 72 to 79.5 (cSt) and in the amount of 2% to 6% by weight; and,
- d. a stabilizing polymer in a range of 12% to 16 % by weight.

1 3. The method of manufacturing a pillar gel candle as recited in Claim 1, wherein each
2 said side wall has a smooth, non-porous inside surface.

3
4 4. The method of manufacturing a pillar gel candle as recited in Claim 1, wherein said
5 inside surface of said mold side walls is made of stainless steel.

6
7 5. The method of manufacturing a pillar gel candle as recited in Claim 3, wherein said
8 mold side walls are made of glass.

9
10 6. The method of manufacturing a pillar gel candle as recited in Claim 1, wherein said
11 mold includes a bottom opening.

12
13 7. The method of manufacturing a pillar gel candle as recited in Claim 1, wherein there
14 are eight side walls of said mold, thereby forming an eight-sided polyhedron.